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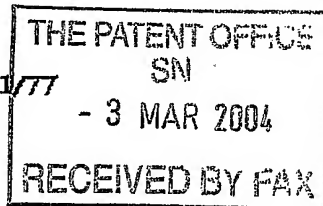
*William Morell*

Dated 7 April 2005

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Patents Form 1/77

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1. Your reference

A11056GB-GMD

2. Patent application number

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0404694.2

- 3 MAR 2004

3. Full name, address and postcode of the or of each applicant (underline all surnames)

 Freight Operators Commercial Access Link (Focal) Limited  
 Coventry University, Innovation Centre  
 Puma Way  
 Coventry  
 Warwickshire CV1 2TW

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

 8822108001  
 United Kingdom

4. Title of the invention

Dolly, and Transportation Using Same

5. Name of your agent (if you have one)

Forrester Ketley &amp; Co.

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

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Patents ADP number (if you know it)

133005

6. Priority: Complete this section if you are declaring priority from one or more earlier patent applications, filed in the last 12 months.

Country

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 Date of filing  
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7. Divisionals, etc: Complete this section only if this application is a divisional application or resulted from an entitlement dispute (see note f)

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8. Is a Patents Form 7/77 (Statement of inventorship and of right to grant of a patent) required in support of this request?

Answer YES if:

- a) any applicant named in part 3 is not an inventor, or
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Otherwise answer NO (See note d)

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Continuation sheets of this form -  
Description 9  
Claim(s) 3  
Abstract -  
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Priority documents -  
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Statement of inventorship and right to grant of a patent (Patents Form 7/77) -  
Request for a preliminary examination and search (Patents Form 9/77) One  
Request for a substantive examination (Patents Form 10/77) -  
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11. I/We request the grant of a patent on the basis of this application.

Signature(s) Forrester Ketley & Co.

*Forrester Ketley & Co.*

Date 3 March 2004

12. Name, daytime telephone number and e-mail address, if any, of person to contact in the United Kingdom

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## DUPLICATE

PATENTS ACT 1977

A11056GB-GMD

Title: Dolly, and Transportation Using Same

5 Description of Invention

This invention relates to a dolly, i.e. a device in the general form of a small platform having a surface on which a materials handling package can be placed, and having wheels facilitating its movement over a surface. The invention also relates to a method of transportation using dollies in accordance  
10 with the invention.

Dollies on which materials handling packages such as crates or pallets can be placed to facilitate their movement over a floor surface, into and out of vehicles, and so forth, are well known. A dolly is usually generally rectangular in plan view, having four wheels of which one pair adjacent one end of the  
15 dolly are rotatable about a fixed axis or axes extending transversely of the dolly while the pair of wheels adjacent the other end may be castor wheels able to pivot to enable the dolly to be steered while it is being moved on its wheels.

The invention has been devised to facilitate the use of dollies to load materials handling packages on to railway wagons of the kind generally used to  
20 transport motor vehicles such as cars, to carry the packages on the wagons while the wagons are moved by rail, and then to unload the packages from the wagons and facilitate movement of the packages to where they are required to be stored or unloaded at their destination.

Railway wagons for motor vehicle transportation, e.g. for carriage of  
25 cars and commercial vehicles from factories where they are assembled to distribution centres which may be far distant, have a deck surface on which the vehicles are driven, and the most common type of deck surface, of which some thousands of wagons are in use in Europe, is of corrugated form comprising ridges extending transversely of the wagon and spaced from one another

lengthwise of the wagon by troughs or recesses. The ridges and troughs therebetween are both, in cross-sectional view, of generally rectangular form. Having been driven onto the wagon, a vehicle is parked in the required position with parking brake applied, and in gear, with chocks applied to its wheels  
5 to prevent it from moving when the wagon is travelling.

After having been used to transport assembled vehicles from the factory, rail wagons for this purpose usually are conveyed back to the factory empty for further use. This is inefficient. Vehicle factories, of course, have delivered to them large numbers of components for vehicle assembly, and it would be  
10 desirable if the wagons used for transporting assembled vehicles from the factory could be used to transport components back to the factory, not necessarily from the point at which the vehicles are unloaded but from some other point which could involve the wagons in a shorter journey while empty. However, the loading of components on the wagons presents problems.

15 Components may be carried in materials handling packages capable of being fitted on dollies to be loaded on the wagons, transported while on the dollies, and unloaded thereon, but conventional dollies are not well adapted to be carried in conventional wagons as described above. As a dolly is essentially a low-height device, the wheels of the dolly usually are of small diameter and  
20 will not run satisfactorily over the corrugated deck of a wagon: the shaking which would be caused to the dolly and a package carried thereby could even be sufficient to shake a load loose from the dolly or cause damage to the components. Accordingly it is one object of the present invention to provide a dolly which is more suitable for use in this manner with vehicle-transporting  
25 railway wagons.

It will, of course, be appreciated that a dolly in accordance with the invention is usable in other situations where like requirements arise, and for road and other vehicles as well as railway wagons.

According to one aspect of the invention, we provide a dolly on which a materials handling package can be carried and having wheels enabling its movement over a support surface, wherein the wheels each have a peripheral surface which comprises a plurality of spaced projections with recesses therebetween. Approximately dimensioned, this enables relatively smooth running on a corrugated support surface with the projections entering troughs between ridges of the support surface.

The projections on the wheel surface may, viewed parallel to the rotational axis of the wheel, and the recesses therebetween, be somewhat rectangular in form, albeit with the sides of each projection converging towards its root (necessitated by the circumferential disposition of the projections) and the projections and recesses having rounded corners.

Such a wheel surface will run satisfactorily over a corrugated support surface in which the corrugations are of generally rectangular form, as described above and commonly used in wagons for motor vehicle transportation. When running transverse to the length of the corrugations, the projections on the wheels enter the troughs between the ridges of the corrugations while the ridges enter the recesses between the projections on the wheels. The wheels may thus run smoothly over the corrugated support surface, without the problem above described when a relatively small diameter circular wheel runs over such a surface.

An example of appropriate dimensions for a wheel suitable for running over a corrugated support surface of the type and dimensions commonly found on railway wagons for vehicle transportation is given hereafter. It will, of course, be appreciated that the dimensions may be different if the wheels are required to run over a support surface of different dimensions.

The width of each wheel should be greater than the spacing between the ridges of the corrugated support surface. This means that if a pivotable castor wheel of the dolly, instead of running transversely to the direction of the

corrugations turns so as to lie parallel to the direction of the corrugations, i.e. with its rotational axis transverse to the direction of the corrugations, the wheel cannot become trapped in the trough between adjacent corrugations.

5 Preferably the wheel is of a rubber and/or polymeric material selected so as to give it the required strength with a degree of resiliency enabling it to roll quietly and easily over a variety of surfaces including plain ground surfaces over which a dolly may be required to be moved prior to loading onto and after unloading from a wagon. The particular form of wheel described will, despite its non-circular profile, run satisfactorily smoothly on a plain ground surface  
10 and, compared with a small diameter circular wheel, surmount small obstacles and steps (e.g. a cable on a warehouse or factory floor) more easily.

A wheel of the construction described may run directly on an axle without the need for an intermediate bearing assembly, this being acceptable for low speeds and small distances over which a dolly is likely to have to be  
15 moved.

The wheels may be rigidly supported by the dolly (although two of them may be pivotable castor wheels) or may be supported by a suspension means allowing them to move upwardly and downwardly relative to the dolly. They may be able to retract relative to the dolly, to facilitate storage of a number of  
20 dollies stacked one upon the other.

The dolly may comprise a platform which is of a plastics material, e.g. injection moulded, affording the surface on which a materials handling package can be carried. The wheels may be partially accommodated in recesses formed in the platform, so that part only of the periphery of each wheel extends out of  
25 the recesses beneath the platform. The upper surface of the platform may be corrugated or otherwise configured to assist in secure location of a materials handling package thereon, and provided with lugs, recesses, and any other features appropriate for the purpose.

The dolly may be provided with coupling means of any appropriate form, enabling a number of dollies to be connected together and handled as a "train" which can be towed.

5 The dolly may be provided with means for accommodating an identification device, e.g. a radio transponder, enabling its whereabouts to be identified and its movements to be tracked.

10 A dolly in accordance with the invention is particularly suitable for use in carrying materials handling packages containing, e.g. motor vehicle components, on railway wagons for motor vehicle transportation. In this use of the dollies, a number thereof would be connected to one another by their coupling means to form a train, either before or after materials handling packages have been placed on the dollies. The train would then be loaded on an appropriate number of the vehicle transportation wagons, being towed onto the wagons from one end of the railway train by a suitable towing vehicle (it  
15 will be appreciated that vehicles such as cars are loaded onto a railway train by being driven forwardly from one end of the train and from wagon to wagon by appropriate interconnecting support surfaces, the vehicles being unloaded at their destination by being driven forwardly off the train of wagons from the end opposite to that at which they were loaded). The train of dollies would be split  
20 into portions suitable for each individual wagon, and secured in each wagon by appropriate restraining straps at the front and rear of the part-train of dollies on that wagon.

It will be noted in this that the configuration of wheel described hereafter interfits with the corrugated load surface of a wagon in such a way as  
25 to provide a chocking effect to some extent, resisting movement of the dollies in addition to the restraint thereof by restraining straps.

At the destination of the loaded dollies, they would be reassembled into a train of dollies and towed off the wagons to be taken to where they are required, e.g. a warehouse or factory.

After having been unloaded of their materials handling packages, empty dollies could be returned to their source or some other point by any appropriate means. A large number of dollies, stacked and otherwise arranged as necessary, could be carried on a single railway wagon.

5 According to another aspect of the invention, we provide a method of transporting goods, comprising loading the goods on a dolly according to the first aspect of the invention, and carrying the dolly on a vehicle which preferably is a railway wagon for motor vehicles, e.g. cars, transportation.

The method may comprise connecting a plurality of dollies together to  
10 form a train thereof, and loading the train of dollies onto at least one of the wagons.

The train of dollies may be secured in position on the wagon by securing means, e.g. fastening straps, connecting the foremost and rearmost dollies on the wagon to the structure of the wagon. If the length of the train of dollies is  
15 such that it occupies more than a single wagon, it may be broken down into portions each comprising an appropriate number of dollies for each wagon.

When secured in position on wagons in such a manner, the configuration of the wheels is such that it interfits with the corrugated wagon load surface, to provide a chocking effect in the manner described hereafter.

20 The invention will now be described by way of example with reference to the accompanying drawings, of which:-

Figure 1 is a perspective view from above and from one corner, of a dolly in accordance with the invention;

Figure 2 is an underneath perspective view of the dolly;

25 Figure 3 is a plan view of the dolly;

Figure 4 is an underneath plan view of the dolly;

Figures 5 and 6 are respectively side and end views of a stack of the dollies;

Figure 7 is a side view of a wheel of the dolly;

Figure 8 illustrates the interaction between a wheel of the dolly and a corrugated load surface of a wagon.

Referring firstly to Figure 1 of the drawings, a dolly in accordance with  
5 the invention comprises a body structure 10 which is in the form of a small platform of generally rectangular shape in plan view, affording an upwardly presented load-carrying surface 11 on which a materials handling package, e.g. a crate or pallet may be placed. In the illustrated embodiment, the surface 11 is corrugated which assists a materials handling package in remaining in position  
10 thereon, but it may be of any configuration or be provided with any retaining formations or the like for this purpose. The platform is made of a plastics material of suitable properties, e.g. injection moulded of such a material, and the underneath of the platform, as visible in Figures 2 and 4, comprises a grid of intersecting reinforcing ribs as indicated at 12.

15 The dolly is provided with four wheels 15, 16, 17, 18, adjacent respective corners of the platform, and as seen most clearly in Figures 5 and 6 the wheels are accommodated in recesses formed between the ribs 12 on the underside of the platform, so that a part only, approximately one-third, of the periphery of each wheel extends outwardly beneath the bottom of the ribs 12  
20 beneath the platform 10. Of the wheels 15-18, a pair 16, 17 or 15, 18 adjacent one end of the dolly may be rotatable about a fixed axis extending transversely of the dolly while the other pair adjacent the other end of the dolly may be pivotable in the manner of castor wheels to facilitate steering of the dolly when it is being moved over a support surface.

25 Although not illustrated in the drawings, the wheels may be supported relative to the platform of the dolly by suspension means providing for sprung upwards and downwards movement of the wheels relative to the platform. Alternatively or in addition, they may be retractable upwardly so as to lie more

fully within the depth of the platform, to facilitate stacking of the dollies on top of one another when they are not in use.

If the facility for the wheels to retract as above described is not provided, Figures 1 and 3 show that the upwardly-presented load carrying surface of the dolly may be provided with recesses as indicated at 20, to facilitate stacking of the dollies on top of one another as shown in Figures 5 and 6, with the wheels of one dolly fitting in the recesses of the dolly beneath.

Further features of the dolly shown in the drawings include coupling devices 21, 22 of any appropriate form at the ends of the dolly, to enable a plurality of dollies to be connected together to form a "train" and moved with one another by being towed. A compartment 23 may be provided with accommodating a transponder device, to enable the position and movements of the dolly to be tracked.

Figure 7 shows in side view, i.e. viewed in a direction parallel to its axis of rotation, one of the wheels 15-18. It is a moulding of a suitable material which preferably incorporates elastomeric and polymeric constituents to give it the required strength while imparting some degree of resilience and wear resistance. It has a body 25 with a central aperture 26 by which the wheel is rotatably received on a suitable axle. The material of the wheel may be such that it can run on the axle without any intervening bearing bush or assembly, bearing in mind that dollies are generally only moved for short distance and slow speeds. The periphery of the wheel comprises a plurality of circumferentially spaced projections 27 with recesses 28 therebetween. The projections 27 and recesses 28 are both somewhat rectangular in form, although the sides of each projection converge towards its root, e.g. at an included angle of  $18^\circ$  as illustrated. The projections and recesses have rounded corners, e.g. with a small radius of some 5mm, as indicated at 29. By way of example only, the radius at the bottoms of the recesses 28 may be of the order of 70mm as

indicated at 30, while the radius at the peripheral surface of the projections 27 may be about 90mm, as indicated at 31.

Figure 8 illustrates how the peripheral surface of a wheel of this configuration runs over a corrugated support surface such as that of the load-carrying deck of a railway wagon for car transportation. In Figure 8, successive corrugations of the deck surface are indicated in broken lines at 35, 36, 37, with troughs defined therebetween. One of the projections 27 of the wheel is illustrated fully occupying the trough between the ridges 35, 36 of the deck, while an adjacent projection 27a of the wheel is about to enter the trough between the ridges 36, 37 of the deck. It will be noted that the projection 27a on the wheel will, prior to entering the trough between the ridges 36, 37, have some tendency to contact the edge 39 of the ridge 37 and this gives a "self-chocking" effect when a train of the dollies is, as above described, secured in a wagon by restraining straps or the like at the front and rear dollies.

The invention thus provides a configuration of dolly, and wheel therefor, which is particularly suitable for enabling transportation of materials handling packages on the return journey of railway wagons for motor vehicle transportation, when the wagons would otherwise normally be empty on such return journeys.

When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

## CLAIMS

1. A dolly on which a materials handling package can be carried and  
5 having wheels enabling its movement over a support surface, wherein the  
wheels each have a peripheral surface which comprises a plurality of spaced  
projections and recesses therebetween.
2. A dolly according to claim 1 adapted for running on a corrugated  
10 support surface with the projections entering troughs between ridges of the  
support surface.
3. A dolly according to Claim 2 adapted to run on a corrugated support  
surface in which the corrugations are of generally rectangular form, and  
15 wherein the projections on the wheel surface are of somewhat rectangular form,  
viewed parallel to the rotational axis of the wheel.
4. A dolly according to Claim 3 wherein the width of each wheel is greater  
than the spacing between the ridges of the corrugated support surface.
- 20 5. A dolly according to any one of the preceding claims wherein the wheels  
are of a rubber and/or polymeric material.
6. A dolly according to any one of the preceding claims comprising a  
25 platform of plastics material, affording the surface on which the materials  
handling package can be carried.

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7. A dolly according to Claim 6 wherein the wheels are partially accommodated in recesses formed in the platform, so that part only of the periphery of each wheel extends out of the recesses beneath the platform.
- 5 8. A dolly according to any one of the preceding claims wherein the wheels are rigidly supported by the dolly.
9. A dolly according to any one of Claims 1 to 8 wherein the wheels are supported by a suspension means allowing them to move upwardly and  
10 downwardly relative to the dolly.
10. A dolly according to any one of the preceding claims wherein the wheels are able to retract relative to the dolly, to facilitate stacking of dollies upon one another.
- 15 11. A dolly according to any one of the preceding claims comprising coupling means enabling a number of dollies to be connected together and handled as a train of dollies.
- 20 12. A dolly according to any one of the preceding claims further comprising means for accommodating an identification device such as a radio transponder.
13. A method of transporting goods, comprising loading the goods on at least one dolly according to any one of the preceding claims, and carrying the  
25 dolly on a vehicle.
14. A method according to Claim 13 wherein the vehicle is a railway wagon for motor vehicle transportation.

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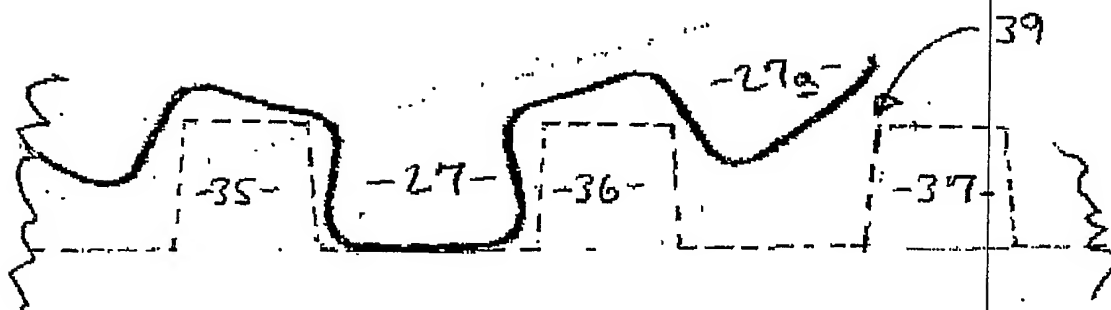
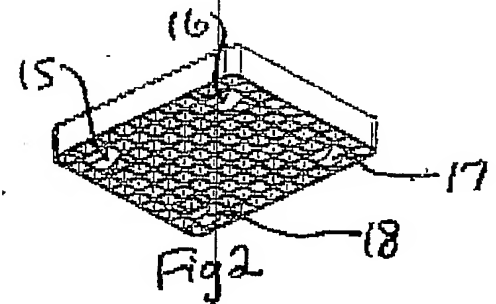
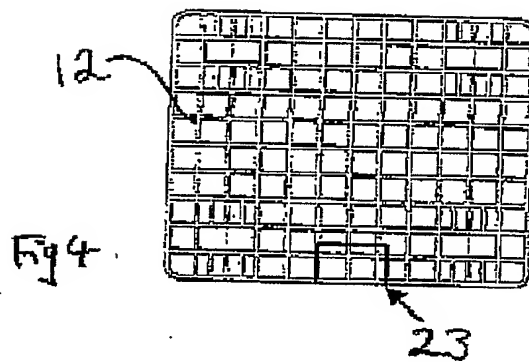
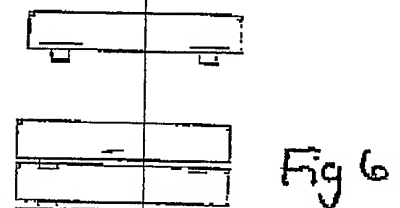
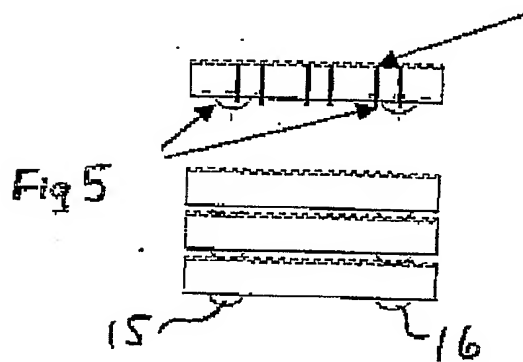
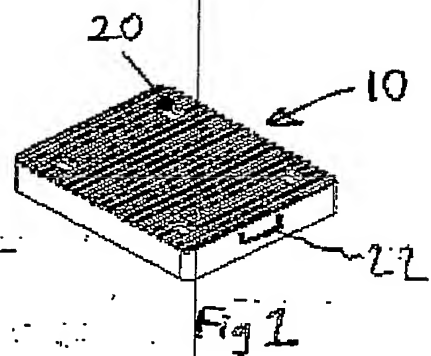
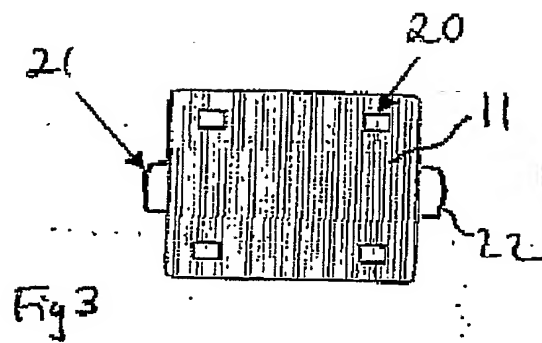
15. A method according to Claim 14 comprising connecting a plurality of dollies together to form a train thereof, and loading the train of dollies onto at least one of the wagons.

5

16. A dolly, or a method of use thereof, substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

17. Any novel feature or novel combination of features described herein  
10 and/or in the accompanying drawings.

1/2





2/2

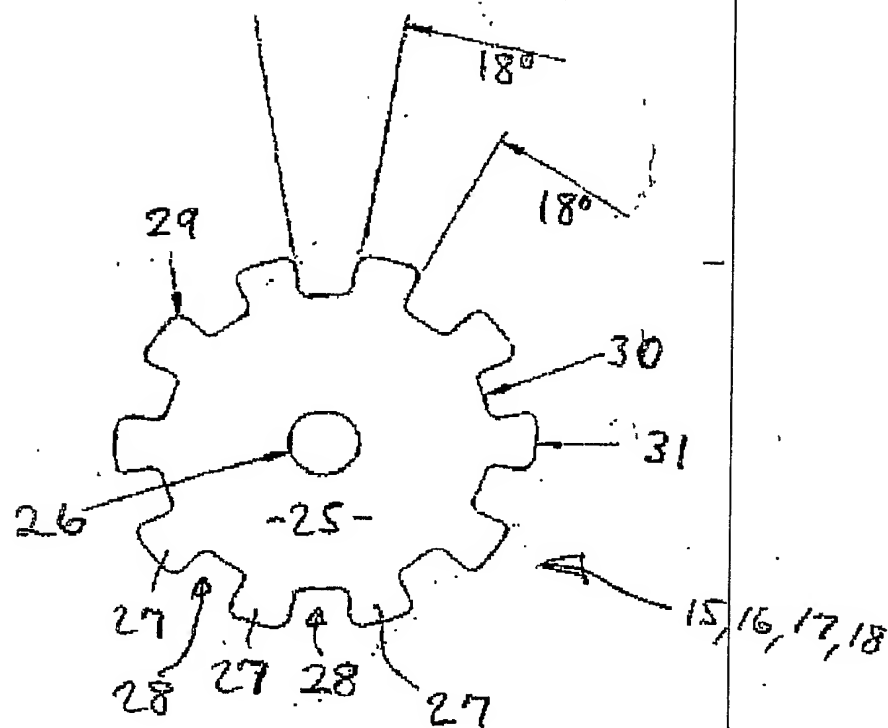


Fig 7

